

THE EFFECT OF DULINGO ON EIGHTH-GRADE STUDENT'S VOCABULARY MASTERY

Jihan Andini

English Education Departement Study Program, Faculty of Tarbiyah and Teacher, University Islam Negeri Sumatera Utara, Indonesia
E-mail: jihan0304201072@uinsu.ac.id

Maryati Salmiah

English Education Departement Study Program, Faculty of Tarbiyah and Teacher, University Islam Negeri Sumatera Utara, Indonesia
E-mail: maryatisalmiah@uinsu.ac.id

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Abstract: This study investigates the impact of using Duolingo to enhance vocabulary acquisition among eighth-grade students at Taman Pendidikan Islam Junior High School in Medan. Ineffective teaching methods are the root cause of the issue of inadequate vocabulary mastering. The study employed a quantitative approach with a pre-experimental design, encompassing all pupils in the eighth grade. Both a pretest and a posttest were administered before and after a two-week period of using Duolingo in order to assess the level of improvement. The results demonstrated a substantial enhancement in students' vocabulary acquisition, as seen by the higher mean score (83.84) on the posttest compared to the pretest (52.80). The statistical study using a paired sample t-test revealed a significance value of 0.000, demonstrating a significant improvement in vocabulary learning as a result of using Duolingo. Ultimately, Duolingo proves to be efficacious in enhancing students' lexical acquisition, offering an enjoyable and engaging educational encounter, and fortifying students' retention through efficient repetition and utilisation of words in many contexts. Based on these findings, it is advised that students use the Duolingo application to increase their vocabulary at Taman Pendidikan Islam Medan Junior High School.

Keywords: *Duolingo, pre-experimental method, English language learning.*

INTRODUCTION

Vocabulary refers to the complete set of words, phrases, and expressions that an individual comprehends and employs when speaking, whether verbally or in written form, in a specific language. Vocabulary encompasses all the words that an individual has acquired, comprehends the significance of, and can employ correctly within the suitable context (Jaelani & Sutari, 2020). Vocabulary is an indicator of a person's linguistic proficiency and their capacity to communicate with precision and effectiveness. Vocabulary is a crucial element of the English language, playing a significant part in comprehending written text and effectively conveying ideas through writing or speech. (Ajisoko, 2022)

Vocabulary acquisition is a crucial component in the process of language learning. Undoubtedly, vocabulary serves as the fundamental basis for comprehending and expressing oneself in any language, including English. Acquiring a high level of vocabulary is crucial for one's educational progress. Mastery of vocabulary is a crucial

aspect of English language acquisition as it facilitates the integration of the four language skills (Jiang et al., 2020)

Thromburycategorises vocabulary into six types: word classes, word families, word formation, word meaning, collocations, and homonyms. Eighth grade junior high school students are typically expected to acquire a range of vocabulary, encompassing commonly used words such as phrases, verbs, nouns, adjectives, and adverbs. These words are essential for effective communication in various contexts, including speech, reading, and writing. Vocabulary is crucial due to its ability to enhance comprehension and facilitate effective communication. Acquiring a strong vocabulary helps enhance language proficiency in many areas, including hearing, speaking, reading, and writing. Furthermore, when learners expand their vocabulary, their academic prowess, self-assurance, and proficiency all improve. (Istiqamah et al., 2023)

The kids of Taman Pendidikan Islam Junior

High School have a low degree of comprehension in vocabulary. Certain students possess a comprehensive comprehension, but others continue to encounter challenges in recalling and using language. According to the data obtained from the English teacher at Taman Pendidikan Islam Junior High School Medan, the eighth grade students have a significant issue with vocabulary mastery. This is evident from the fact that many students frequently ask the English teacher to translate the learning material from English to Indonesian during lessons. Subsequently, during the direct interviews conducted by the researcher with the students of SMP Taman Pendidikan Islam Medan, it was found that five out of seven students were unable to provide satisfactory responses to the researcher's inquiries. This issue arises due to a lack of emphasis from teachers on students' vocabulary development. Students are typically instructed to just memorise language without being taught how to effectively apply it in their daily lives. Consequently, the vocabulary they have memorised is not fully internalised or utilised. An inherent drawback of the memorising method is that if the acquired vocabulary is not actively utilised in daily life, pupils are prone to experiencing a rapid decline in their ability to recall the memorised vocabulary. (Permatasari et al., 2022)

Hence, the proposed approach to address these issues is to implement supplementary educational resources that can assist students in acquiring a comprehensive vocabulary. One such resource is the use of educational platforms like the Duolingo application. Duolingo is an internet-based language acquisition tool created to assist users in acquiring new languages through an engaging and enjoyable approach. The primary objective of Duolingo is to enhance the accessibility, affordability, and effectiveness of language learning for all individuals, while maintaining a high standard of quality (Shortt et al., 2023). Duolingo offers interactive lessons for vocabulary acquisition and provides comprehensive ideas and explanations on word usage in many scenarios.

One reason why the Duolingo app might be an effective tool for enhancing pupils' vocabulary is that it offers an enjoyable and captivating learning experience. Through the incorporation of gamification, users are encouraged to actively participate in the learning process, thereby mitigating monotony and enhancing their incentive to persist in learning. Regarding language, engaging in these play activities

facilitates the connection between new words and pleasurable experiences, so enhancing both short-term and long-term memory.

Furthermore, the application provides efficient reinforcement. The fundamental principle of repetition is crucial in enhancing vocabulary. Duolingo employs machine learning algorithms to adapt practice and repetition dynamically, taking into account the user's level of proficiency. (Apoko et al., 2023) In this manner, vocabulary that requires further strengthening will be consistently presented, while those that have already been mastered will be periodically reintroduced to enhance comprehension.

Wijaya (2016) carried out a similar study, and their findings indicated that using the Duolingo app increased students' passion for learning in Klender, East Jakarta. Subsequently, (Chasanah & Halim, 2024) carried out a study on a related topic and discovered that the Duolingo program is useful for learning English.

Furthermore, Duolingo offers a diverse range of learning environments and scenarios. Users will engage with terminology in diverse and pertinent contexts, encompassing ordinary discussions as well as specialised subjects like food, travel, or even business. By engaging in this approach, users not only acquire knowledge of the words themselves, but also gain proficiency in their practical application, so enhancing their entire communication abilities.

METHOD

This study employs quantitative research methodologies. The quantitative research method as a research method that focuses on collecting and analyzing data that can be measured numerically. (Wagner, 2020) The study population consisted of 25 children who were all VIII grade students at Taman Pendidikan Islam Medan Junior High School. These pupils were selected as subjects for the study. The researchers in this study utilised a pre-experimental design known as the One Group Pretest Posttest Design. This design involves administering an initial test (pretest) before the treatment is given, and then conducting a final test (posttest) using the same set of questions after the treatment has been administered. The research design is displayed in Table 1 below.

Table 1. Desain one group pretest posttest

| Pretest | Treatment | Posttest |
|---------|-----------|----------|
| O_1 | X | O_2 |

Description:

O_1 : Initial test before treatment with Duolingo

X : Treatment with Duolingo

O_2 : Final test after treatment with Duolingo

The instrument utilised in this study was a vocabulary assessment comprising of 50 multiple-choice questions. The vocabulary included in the questions was selected in accordance with the goals and objectives of the English course at their respective level. The vocabulary were discovered in the summary glossary of the primary textbook used in the eighth grade at Taman Pendidikan Islam Junior High School in Medan. The question kinds employed include: lexical semantics, synonyms, antonyms, algorithms, word associations, and object attributes.

To ensure the data followed a normal distribution, this study used Kolmogorov-Smirnov and Shapiro-Wilk normality tests. The results obtained showed that the significance values for the pretest and posttest were greater than 0.050, indicating normally distributed data. The normality of this data is important to ensure the internal validity of subsequent statistical testing.

There are multiple procedures involved in conducting the normalcy test to ascertain this. The first stage in determining whether the data is normal is to visualize the way the data are distributed. The approach taken by The QQ plot, also known as the Quantile Quantile plot, is employed by researchers. Next, we'll take a closer look at the data's descriptive statistics by examining the Utilizing the mean, median, and standard deviation, approximate an understanding of the data's distribution.

In order to assess the level of vocabulary proficiency among eighth-grade students at SMP TPI Medan, a series of vocabulary exams were administered. The pre-test aimed to assess the students' comprehension of the subject matter prior to any additional intervention or instruction. The examination comprised a set of fifty multiple-choice questions specifically designed to match the students' individual proficiency level.

(1) The researcher observed the students' conditions and conducted direct examinations on a number of pupils to assess their degree of knowledge. (2) Established the research sample. (3) Designing research instruments involves creating assessment tools that align with student study recommendations. (4) In this case, the assessment tool is a test with 50 multiple choice questions. (5) Verifying the functionality and accuracy of the created instrument. (6)

Performing a preliminary assessment to assess students' first proficiency in language. (7) Utilise the Duolingo programme to administer treatment aimed at enhancing students' proficiency in vocabulary. (8) Participants were instructed to utilise the Duolingo programme for a duration of two weeks at their own residences, dedicating 30 minutes each day to practicing. (9) Administer a post-test to ascertain if there is a discernible improvement in proficiency following the utilisation of Duolingo. (10) Formulate findings and conduct data analysis based on the acquired data.

A post-test is an assessment carried out subsequent to the administration of a treatment. The objective is to evaluate the pupils' proficiency and ascertain any alterations caused by the intervention. The outcome of the posttest will serve as the response to the research inquiry. The posttest is identical to the pretest in terms of test format, difficulty level, and number of questions.

The t-test, which may be applied with a small sample size, is the best statistical technique for comparing two means. Following the gathering of data, the The researcher then carried out the data analysis to determine whether there was a change in pupils' acquisition of language following the intervention. The investigator decided to carry out a repeated actions t-test to assess the influence of the course of action. The evaluation criteria include expressed as follows: According to H_0 , there isn't notable variation in the vocabulary of the kids accomplishment both prior to and following education through the Duolingo software. The standard for When the alpha level is more than 0.05 ($\alpha > 0.05$), H_0 is accepted. H_1 , on the other hand, claims that there is a notable change in the vocabulary development of students following instruction using Duolingo. H_1 app is deemed acceptable if the alpha level is smaller than 0.05 ($\alpha < 0.05$).

RESULTS AND DISCUSSION

The study population for this research, which was conducted at Taman Pendidikan Islam Junior High School in Medan, consisted of 25 children who were all enrolled in the school's 8th grade. Pre-experimental research design and quantitative methodology were employed in this study. The students took part in vocabulary learning sessions for two weeks, and data on vocabulary learning was collected using a vocabulary test that was given both before and after the intervention period.

Test of normality

One of the precondition tests for doing the Paired Sample ttest is the normality test, which determines whether or not the data is regularly

distributed. The outcomes of the normalcy are as follows: evaluate the concept of understanding post-test data.

Table 2. Normality test results

| Tests of Normality | | | | | | |
|--------------------|---------------------------------|----|-------|--------------|----|------|
| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | Statistic | df | Sig. | Statistic | Df | Sig. |
| Pretest | .134 | 25 | .200* | .933 | 25 | .102 |
| Posttest | .151 | 25 | .143 | .942 | 25 | .168 |

*. This is a lower bound of the true significance.

The data used in the study belonged to small-scale data (<50 data), so the Tests of Normality were Shapiro-Wilk. The analysis results show that the significance value (Sig.) of the pretest is 0.102 and the posttest is 0.168. The resulting significance value is greater than 0.05 (>0.05). Therefore, parametric tests using the Paired Sample t-test can be performed. This indicates that there is a normal distribution of data on pupils' vocabulary mastery.

The hypotheses in this study are: H0: Before and after using the Duolingo application as a teaching aid students' mastery of terminology is not significantly different. Ha: Students' vocabulary mastery before and after using the Duolingo program as a learning tool is significantly different. Findings from the paired sample t-test analysis, which are shown in the table below as paired sample statistics, paired sample correlation, and paired sample test (sig-2tailed), were used to test the above-mentioned hypotheses.

Test of hypotesist

Table 3. Paired sample statistics

| Paired Samples Statistics | | | | | |
|---------------------------|----------|-------|----|----------------|-----------------|
| | | Mean | N | Std. Deviation | Std. Error Mean |
| Pair 1 | Pretest | 52.80 | 25 | 18.157 | 3.631 |
| | Posttest | 83.84 | 25 | 9.344 | 1.869 |

The average score after using the Duolingo application is greater than before, with an average pretest score of 52.80 and an average posttest score of 83.84, as per the t-test results above. This

demonstrates that following their use of the app as a teaching tool The lexical proficiency of the students has grown.

Table 4. Paired samples statistics

| Paired Samples Correlations | | | | |
|-----------------------------|--------------------|--|----|-------------|
| | | | N | Correlation |
| Pair 1 | Pretest & Posttest | | 25 | .968 |
| | | | | Sig. .000 |

The results of the uji korelasi sampel berpasangan indicate that the significance level is approximately 0.000, while the level of sig > 0,00

indicates that Pretest and posttest have a relationship, or there is one a meaningful connection.

Table 5. Paired sample test

| Paired Samples Test | | | | | | | | |
|---------------------|--------------------|---------|----------------|-----------------|---|---------|---------|-----------------|
| Paired Differences | | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | Sig. (2-tailed) |
| | | | | | Lower | Upper | | |
| Pair 1 | Pretest - Posttest | -31.040 | 9.401 | 1.880 | -34.920 | -27.160 | -16.509 | .000 |

This indicates that there is a difference in students' vocabulary mastery before and after they use the duolingo application as a learning media,

leading to the rejection of the null hypothesis (Ho). The significant value of the t-test, as

demonstrated by the Paired Sample Test findings, is smaller than 0.05, or 0.000.

The paired t-test was used to compare pretest and posttest scores. The results are as follows:

The negative t value and p value <0.05 indicate that there is a significant difference between the pretest and posttest scores. This means that the use of Duolingo has a significant impact on students' vocabulary acquisition. The findings corroborate that the Duolingo app is an effective tool for improving students' vocabulary acquisition and can be implemented more widely in educational contexts.

Researchers conducted two sessions in this investigation. During the initial meeting, the researcher administered a diagnostic test to assess the level of word comprehension among eighth grade pupils. The examination lasted for a duration of 40 minutes and consisted of 50 multiple-choice questions. Following the completion of the multiple choice questions, the researcher proceeded to implement the treatment by providing an introduction to the duolingo application and its usage. Subsequently, the researcher instructed the students to download the Duolingo application into their personal devices and utilise it for a duration of 30 minutes on a daily basis. The treatment or trials will be conducted separately for a duration of two weeks. Subsequently, the researcher will administer a post-test using the same instrument to determine if there is an increase following the therapy. The statistics clearly demonstrate that the Duolingo App has the potential to enhance the teaching and learning of students' vocabulary. The Duolingo App facilitates students' comprehension of vocabulary translation. Students possess the ability to comprehend the meanings of words that are similar or opposite in meaning to other words. Furthermore, the utilisation of the Duolingo programme enhances pupils' ability to excel in answering multiple choice test questions.

The findings presented here are consistent with prior studies indicating that the Duolingo App has the potential to enhance students' English vocabulary and their proficiency in comprehending words (Anisa Dwi Tiara, M. Arinal Rahman, 2021). In addition, a further study found that using the Duolingo App is an efficient method for enhancing students' English vocabulary (Siregar, 2019, p. 61). Thus, the Duolingo App, as a tool for learning vocabulary, has proven to be significant in prior study by effectively enhancing students' English vocabulary (Erfiani & Miski, 2022)

The data collected from the vocabulary test revealed that the lowest pre-test score was 24, while the maximum score recorded was 84. Following the completion of treatment and testing, the lowest score obtained in the post-test was 68, while the maximum score achieved was 100. This demonstrates a notable alteration in value following the utilisation of the Duolingo programme. The average score of the pretest was 52.80, while the average score of the post-test was 83.80.

The research utilises small-scale data, defined as having less than 50 data points. Therefore, the Shapiro-Wilk test is employed to assess normality. The study results indicate that the pretest significance value (Sig.) is 0.102, whereas the posttest significance value is 0.168. The obtained p-value is greater than 0.05 (>0.05), indicating that the data follows a normal distribution. Thus, it is possible to do a parametric test using the Paired Sample t-test.

The results of the bivariate test using Paired Sample t-test indicate that the significance value (Sig. 2-tailed) is 0.000, which is smaller than the threshold of 0.05 ($0.000 < 0.05$). Therefore, it can be concluded that there is a significant difference between the pretest value and the posttest value. The t-value is negative, specifically -16.509, suggesting that the posttest value is greater than the pretest value. The Duolingo application approach has a substantial impact on vocabulary acquisition, leading to a conclusive finding.

To integrate Duolingo in student teaching practices, teachers can use Duolingo as an additional home assignment that supports the material taught in class.

The research findings show a significant improvement in students' vocabulary acquisition after using Duolingo. However, there is an aspect to note that the improvement may also be due to the fact that students spent more time learning vocabulary compared to the traditional method. The use of the app might encourage students to study more frequently.

The findings of this study strengthen the existing literature on the effectiveness of using technology in language learning. Previous studies have shown that apps such as Duolingo can improve student motivation and learning outcomes in various contexts. This study provides further empirical evidence that Duolingo can be effectively used to improve the vocabulary acquisition of secondary school students in Indonesia, particularly at Taman Pendidikan Islam Junior High School. This research supports

the use of technology-based approaches in language teaching, which can serve as a model for other educational institutions facing similar challenges in student vocabulary acquisition.

Thus, this study not only confirms the effectiveness of Duolingo in improving vocabulary acquisition, but also provides practical guidance for educators to integrate this technology in their teaching practices.

CONCLUSION

A strong command of vocabulary is essential for comprehending and expressing oneself effectively in the English language. Enhancing language proficiency is of utmost significance for pupils, encompassing the domains of hearing, speaking, reading, and writing. The pupils at Taman Pendidikan Islam Junior High School have a limited vocabulary, as evidenced by their frequent requests for translation from the teacher and their struggles to answer direct questions from the researcher. The primary source of this issue can be attributed to the utilisation of poor pedagogical approaches, wherein students are predominantly required to commit information to memory without sufficient opportunities for practical application.

This study employed a quantitative approach with a pre-experimental design, encompassing all 8th grade students at Taman Pendidikan Islam Junior High School in Medan. The study was done by administering a pretest, followed by a two-week therapy using Duolingo, and concluding with a posttest. The posttest findings revealed a substantial enhancement in students' proficiency in vocabulary following the utilisation of Duolingo. The mean posttest score (83.84) exceeded the pretest score (52.80). Paired Sample t-test analysis revealed a significant disparity between the pretest and posttest scores, with a significance value of 0.000. This suggests that the utilisation of Duolingo had a substantial positive impact on students' vocabulary acquisition.

This discovery aligns with prior studies that demonstrates the effectiveness of Duolingo in enhancing students' acquisition of English vocabulary. The application facilitates students' comprehension of vocabulary translation, synonyms, antonyms, and enhances their ability to answer questions effectively. Ultimately, the utilisation of the Duolingo application has proven to be a highly effective method for enhancing the vocabulary acquisition of eighth-grade students at Taman Pendidikan Islam Junior High School in

Medan. This success suggests that the programme has significant potential for implementation within a wider educational framework.

This research makes a significant contribution to the field of language education, particularly in the context of technology-based learning. This study validates that the use of apps such as Duolingo can significantly improve students' learning outcomes in English vocabulary acquisition.

Thus, this study not only confirms the effectiveness of Duolingo in improving students' vocabulary acquisition, but also opens up opportunities for further exploration in the use of educational technology for more effective and enjoyable language teaching.

REFERENCES

- Ajisoko, P. (2022). Using Duolingo apps to improve english reading comprehension of engineering students in Universitas Borneo Tarakan. *Exposure : Jurnal Pendidikan Bahasa Inggris*, 11(1), 1–6. <https://doi.org/10.26618/exposure.v11i1.6452>
- Amelia, M. (2024). Duolingo & English vocabulary: How Students acquire new vocabulary by playing the game. *International Journal of English Language Teaching*, 12(4), 1-8.
- Ananda, S. S., Setiaji, A., & Kustantinah, I. (2023). The role of duolingo application to improve students' vocabulary mastery at junior high school in academic year 2023/2024. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 9(5), 1124-1133.
- Anisa Dwi Tiara, M. Arinal Rahman, C. H. (2021). The students perception about use of duolingo application for improving english vocabulary. *International Journal of Education, Information Technology and Others (IJEIT)*, 4(4), 690–701. <https://doi.org/10.5281/zenodo.5775915>
- Apoko, T. W., Dunggio, A. A., & Chong, S. L. (2023). The students' perceptions on the use of mobile-assisted language learning through duolingo in improving vocabulary mastery at the tertiary level. *English Review: Journal of English Education*, 11(1), 17–26. <https://doi.org/10.25134/erjee.v11i1.7069>
- Aulia, H. R., Wahjuningsih, E., & Andayani, R. (2020). the effect of duolingo application on students' english vocabulary mastery. *Eltr journal*, 4(2), 131-139.
- Barella, Y., Fergina, A., Mustami, M. K., Rahman, U., & Alajaili, H. M. A. (2024). Quantitative methods in scientific research. *Jurnal Pendidikan Sosiologi Dan Humaniora*, 15(1), 281. <https://doi.org/10.26418/j-psh.v15i1.71528>
- Chasanah, A. Z., & Halim, A. (2024). The effectiveness of using duolingo as an interactive learning media. *Cendikia : Media Jurnal Ilmiah*

- Pendidikan T1*, 4(6), 638–646.
- DW, L. A. (2020). The effect of Duolingo on English as Foreign Language university students' vocabulary mastery. *Revolution*, 4, 209-215.
- Erfiani, E., & Miski, C. R. (2022). The use of duolingo in enhancing students' vocabulary mastery at SMA Negeri 3 Bangko Pusako during pandemic covid-19. *Indonesian Journal of Integrated English Language Teaching*, 8(1), 55. <https://doi.org/10.24014/ijelt.v8i1.17972>
- Hafifah, H. (2021). The effectiveness of Duolingo in improving students' speaking skill at Madrasah Aliyah Bilingual Batu school year 2019/2020. *Language-Edu*, 10(3).
- Istiqamah, N., Latifa, A., & Larekeng, S. H. (2023). Utilizing Duolingo application as a learning media in teaching english to enhance the students' vocabulary mastery of the second grade SMPIT Bina Insan Parepare. *Journal of Linguistics and English Teaching Studies*, 4(2), 145–154. <https://jurnal.stainmajene.ac.id/index.php/lets/>
- Jaelani, A., & Sutari, D. R. (2020). Students' perception of using duolingo application as a media in learning vocabulary. In: *Bogor English Student and Teacher (BEST) Conference*, 2, 40–47.
- Jiang, X., Rollinson, J., Plonsky, L., & Pajak, B. (2020). Duolingo efficacy study: Beginning-level courses equivalent to four university semesters. *Duolingo Research Report*, 2020, 11. <https://www.duolingo.com/efficacy>
- Lahmady, N., Yahrif, M., & Ibrahim, M. (2023). The use of duolingo to increase the students' vocabulary mastery at junior high school. *MERDEKA :JurnalIlmiahMultidisiplin*, 1(2), 293–300. <https://doi.org/10.62017/merdeka.v1i2.602>
- Megawati, Hamid, R., & Sangkala, I. (2023). Improving the vocabulary of the students by using duolingo application at the second grade of SMP Negeri 1 Kelara. *English Language Teaching Methodology*, 3(1), 13–19. <https://doi.org/10.56983/eltm.v3i1.176>
- Nasrul, V., & Fatimah, S. (2023). The effect of using duolingo application on students english learning motivation and vocabulary enrichment: An experimental research at SMKN 1 Padang. *Journal of English Language Teaching*, 12(3), 933–952. <https://doi.org/10.24036/jelt.v12i3.125020>
- Permatasari, P., Sudirman, A., & Munawaroh, T. (2022). The effect of using duolingo application towards students' vocabulary mastery at the eighth grade of SMPN 2 Banjarsari Lebak-Banten. *Journal of English Language Learning*, 6(2), 142–148. <https://doi.org/10.31949/jell.v6i2.3624>
- Pba, M., & Lamongan, U. (1994). *Khoirotnun' mahadalah*. 121–136.
- Pratasik, G. (2022). Learning English vocabulary through the Duolingo application to help young learners' reading skill. *Journal of English Language Teaching, Literature and Culture*, 1(1), 54-60.
- Purwanto, A. A., & Syafryadin. (2023). Students' perception on using duolingo for learning english vocabulary. *JET (Journal of English Teaching)*, 9(1), 70–82. <https://doi.org/10.33541/jet.v9i1.4506>
- Sakkir, G., & Syamsuddin, N. A. (2023). Students' perceptions of Duolingo Mobile assisted language learning (MALL) in learning English vocabulary. *EduLine: Journal of Education and Learning Innovation*, 3(3), 381-388.
- Sari, L. P., Hastomo, T., & Nurchurifiani, E. (2023). Assessing the efficacy of duolingo for acquiring english vocabulary skills: experimental research. *Journal of English Teaching, Applied Linguistics and Literatures (JETALL)*, 6(2), 193. <https://doi.org/10.20527/jetall.v6i2.17145>
- Shortt, M., Tilak, S., Kuznetcova, I., Martens, B., & Akinkuolie, B. (2023). Gamification in mobile-assisted language learning: a systematic review of Duolingo literature from public release of 2012 to early 2020. *Computer Assisted Language Learning*, 36(3), 517–554. <https://doi.org/10.1080/09588221.2021.1933540>
- Suhendar, B., & Syakir. (2022). Penggunaan aplikasi smartphone untuk pengajaran kosakata bahasa inggris bagi anak usia sekolah dasar, Klender Jakarta Timur. *Community Engagement & Emergence Journal*, 3(3), 242–243.
- Syakir, A. (2020). Developing students vocabulary at elementary school by using words game. *Mahaguru: Jurnal Pendidikan Guru Sekolah Dasar*, 1(2), 38-45.
- Tsamratulaeni. (2023). Using Duolingo application in teaching vocabulary at seventh grade of SMPN 3 Pitumpanua. *DEIKTIS: Jurnal Pendidikan Bahasa Dan Sastra*, 3(3), 190–205. <https://doi.org/10.53769/deiktis.v3i3.537>
- Wardah, W. (2022). Meningkatkan hasil belajarpenguasaankosakata bahasa inggrismelaluipenggunaan model make a match. *LANGUAGE :Jurnal Inovasi Pendidikan Bahasa Dan Sastra*, 2(2), 138–146. <https://doi.org/10.51878/language.v2i2.1217>
- Wagner, E. (2020). Duolingo english test. *Language Assessment Quarterly*, 17(3), 300–315. <https://doi.org/10.1080/15434303.2020.1771343>
- Wijaya, R. K., Yufriзал, H., & Kadaryanto, B. 2016. (2016). Improving vocabulary through duolingo application in call at the seventh grade of SMP mastered. *U-JET: Unila Journal of Engglesh Teaching*, 5(1–11), 10–11.
- Wiyati, R., & Amelia, S. (2022). Students' reflection toward learning vocabulary using duolingo

- application. *JELA (Journal of English Language Teaching, Literature and Applied Linguistics)*, 4(1), 17-26.
- Yazid, A., Ma'arif, M. S., & Firdaus, M. A. (2023). The effect of duolingo media application in improving arabic vocabulary mastery of class VIII Students at MTsN 6 Nganjuk. *Al-Wasil*, 1(1), 26-49.
- Yusda, D. D., Nanda, D. S., Pratiwi, T. L. M., & Haninun, H. (2020). An analysis of using duolingo application in improving students' vocabulary mastery at 10th grade Of SmaYadika Bandar Lampung. *BeyondLinguistika*, 3(2), 18–23.
- Zulfitri, K. M. (2023). The effect of duolingo online application on students' english vocabulary mastery of vii grade class at SMP Al Razi Sinar Harapan. *Jurnal Pusat Studi Pendidikan Rakyat*, 3(2), 62–70. <https://doi.org/10.51178/jpspr.v3i2.1358>